GRANT NO: N00014-89-J-3070
Title: Characterization of Ground Squirrel Retinal Ganglion Cells

PROGRESS REPORT (Covers period 7-1-89 TO 12-31-89):

PERSONNEL:

Name	Title	Period of Service From	Period of Service To	% Effort
N. Lugo-Garcia, Ph.D.	P.I.	7-1-89	12-31-89	25
R. E. Blanco, Ph.D.	Co-I.	7-1-89	12-31-89	20
Jacqueline Caban	Technician	7-1-89	12-31-89	100

Most of our efforts during the first six months of funding has been dedicated to our first specific objective: to characterize the dendritic arborizations of ganglion cells projecting to the dorsal lateral geniculate nucleus and the superior colliculus. Some technical difficulties were successfully dealt with and a few preliminary results have been obtained.

Rhodamine labeled latex microspheres were stereotaxically injected into both superior colliculi of three ground squirrels. Survival times ranged from ten days to two months. The long survival periods resulted in labeling of large numbers of retinal ganglion cells. These cells were often completely filled with the beads (Fig. 1). To visualize in detail the dendritic arborization of this population of ganglion cells, we made intracellular injections of Lucifer Yellow (Fig. 2). To date we have not received the micromanipulator and electrophysiological apparatus which is necessary to make these intracellular injections. We have been using similar, but not optimal, equipment at the Institute. We expect that once our equipment is complete and some remaining problems are resolved, the quality of our injections will improve, and we will be able to inject more cells in each preparation.

Other experiments in our laboratory relate to the nature of neurotransmitters/modulators in the ground squirrel retina (Lugo-Garcia, et al., 1990)*. This work will be presented at the American Association of Anatomists meeting to be held in Philadelphia on April, 1990.

*Lugo-Garcia, N., R.E. Blanco, T.E. Hughes and H. Karten, Localization of GAD-like and GABA-like immunoreactivity in the ground squirrel retina. Anatomical Record (1990) (submitted)

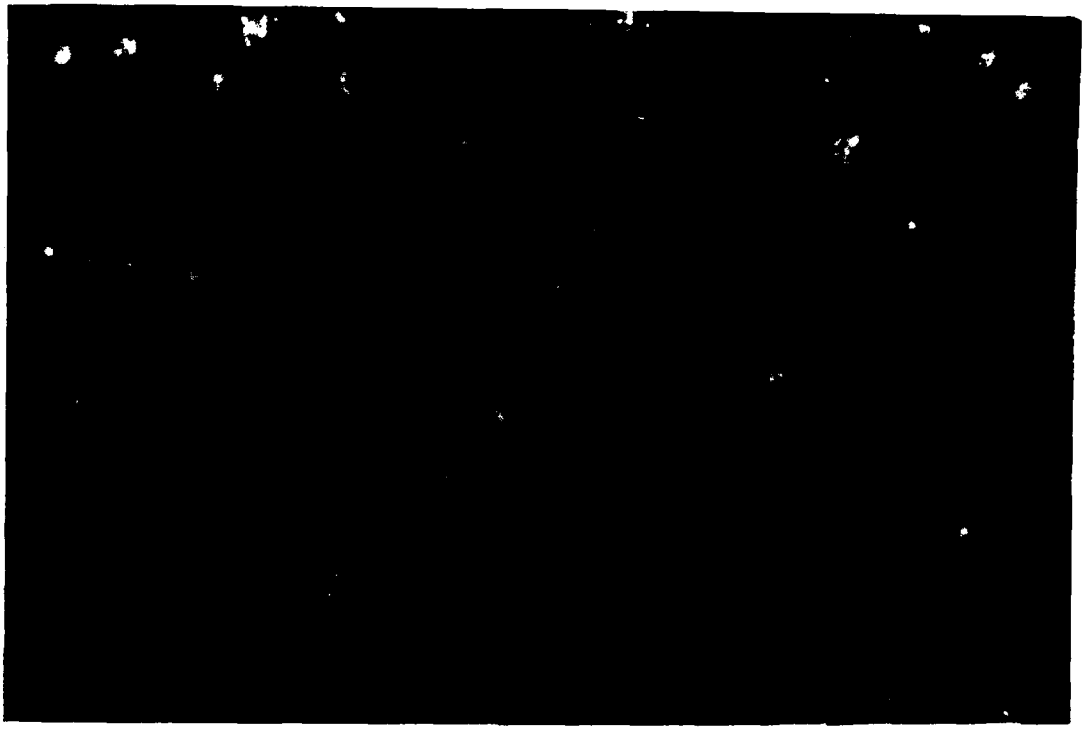

Fig. 1 Photomicrograph of labeled retinal ganglion cells after injecting rhodamine beads into the superior colliculus

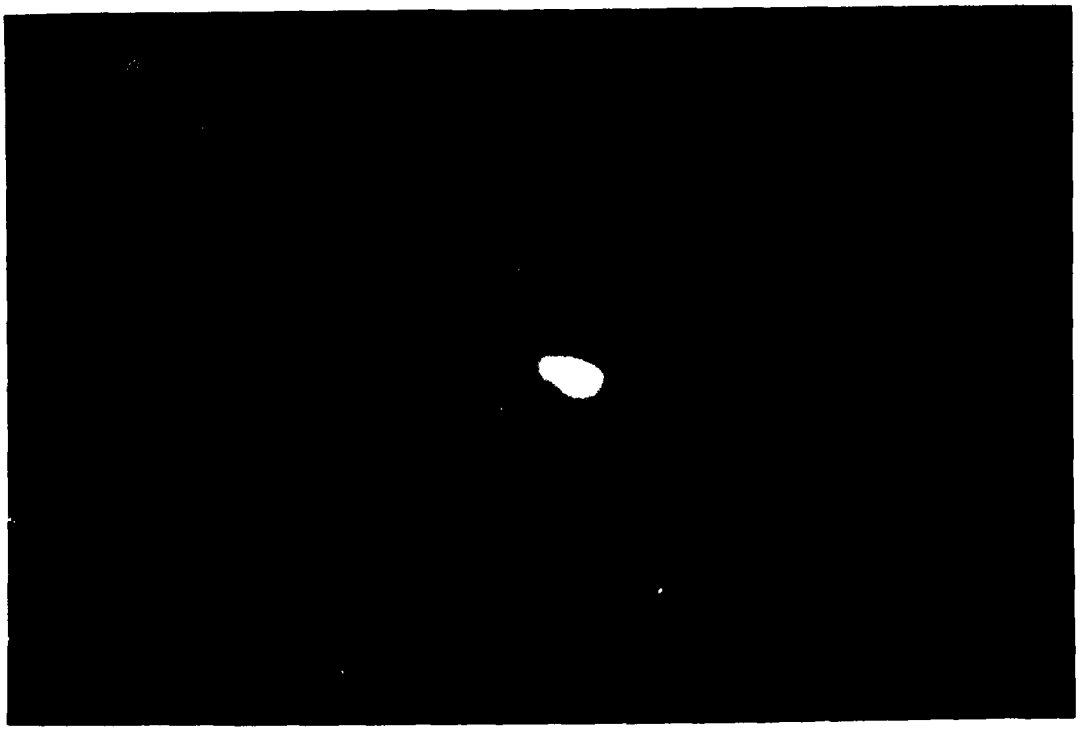

Fig.2 Retinal ganglion cell intracellularly injected with Lucifer Yellow

LUGO-GARCIA, Nidza, Rosa Esther BLANCO*, Thomas E. HUGHES* and Harvey KARTEN, Dept. of Anatomy and Institute of Neurobiology, University of Puerto Rico, San Juan, Puerto Rico; Dept. of Neurosciences, UCSD, La Jolla, California. Localization of GAD-like and GABA-like immunoreactivity in the ground squirrel retina.

The identification of retinal neurotransmitters/modulators remains central to a complete understanding of the role of the retina in visual function. Immunohistochemical techniques have provided a precise means of identifying populations of retinal neurons which utilize specific neurotransmitters/modulators. We have used immunohistochemical methods to identify and characterize GABAergic neurons in the ground squirrel retina. Retinas were incubated with antibodies against glutamic acid decarboxylase (GAD) and gamma aminobutyric acid (GABA) and processed for fluorescence and/or avidin biotin labeling. Immunoreactivity was expressed in the inner nuclear layer (INL), inner plexiform layer (IPL), and ganglion cell layer (GCL). Immunoreactive neurons in the INL were identified as small amacrines with cell bodies near the inner nuclear/inner plexiform border. Labeled cells in the GCL may be either ganglion cells and/or displaced amacrines. The number of immunoreactive neurons was greater in retinal sections incubated with the GABA antiserum. Immunoreactive neurons in the INL and GCL gave rise to processes that entered the IPL. Immunoreactive processes ran through all IPL sublayers, but the staining intensity was highest in the innermost and outermost sublaminae. Thus, GAD and GABA immunoreactivity may be present in amacrine, displaced amacrine, and perhaps ganglion cells. (Supported by NIH Grant NS-07464, Navy Grant N00014-89-J-3070 and RCMI Grant RR-03051).

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